PARAFFIN BLOCKS FOR GROWING SEEDLINGS IN LIQUID CULTURE SOLUTIONS[1]

CONRAD HOFFMANN

(WITH THREE FIGURES)

In growing seedlings of any kind in nutrient solutions a suitable means of supporting the individual plants is essential. The method commonly employed consists in the use of ordinary corks perforated so as to hold a varying number of seedlings. Invariably the corks are of such a size as to fit snugly in the neck of the vessel containing the nutrient culture solution. This apparatus, while satisfactory to a certain extent, offers several objections. The corks usually discolor the nutrient solution, the extent of discoloration depending upon the grade of cork employed, as well as upon the composition of the nutrient solution. This discoloration is due to soluble compounds, presumably organic in nature, which can be inferred to have some influence—beneficial or detrimental—upon the growing seedlings. The corks soon warp and crack and become unfit for further use. Further than this, they furnish a substratum for molds, which frequently give trouble by infecting the seedlings to be grown.

These were some of the objections and difficulties encountered in the course of certain experimental work with growing seedlings. It was necessary in this work to grow a large number of seedlings in different culture solutions, which necessitated the employment of a large number of supports. The support which was finally adopted after considerable experimentation proved so satisfactory as to warrant its description and publication at this time.

In place of the ordinary cork a paraffin block molded in the desired shape and size and perforated to suit the needs of the experiment has been used. It has been found advisable to employ a paraffin of comparatively high melting point, so as to prevent any melting or softening of the blocks under the direct rays of the sun to which they will be exposed in the course of their use.

[1] Published with permission of Director of Wisconsin Experiment Station.

To obtain blocks of the desired thickness and size, the following procedure has proved most effective. The paraffin is placed with sufficient distilled water in a suitable vessel and boiled vigorously. The paraffin can then be removed from the surface of the water

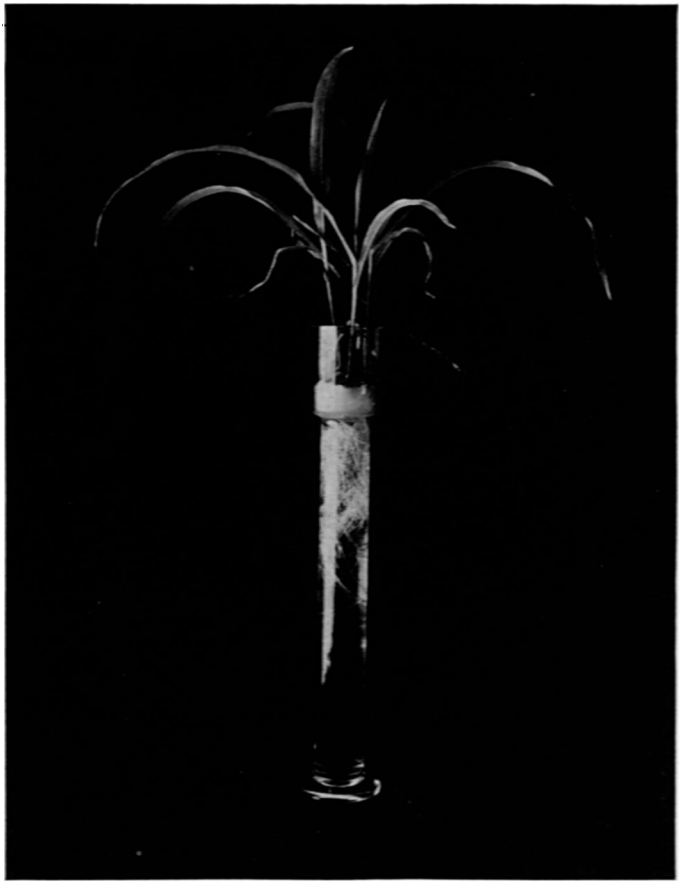

FIG. 1.—Showing use of paraffin block and hydrometer cylinder for growing seedlings in nutrient solutions.

and poured into a large cylindrical mold. This mold is best made out of some heavy paper and can be made of any desired diameter. After solidification of the paraffin within this mold, the various-sized cylinders can be cut off in much the same manner that bread

is cut. These cylindrical blocks can be made of any thickness, and by varying the size of the mold can be made of any diameter. To render the cutting of the paraffin more satisfactory, the mold can be placed at a temperature of 30–35° C., which will be sufficient to keep the paraffin in a pliable condition. Another method for securing these blocks which has given good satisfaction is to pour the hot water and paraffin into shallow pans, forming a layer of paraffin above the water of any desired depth, and then allowing it

FIG. 2.—Seedlings in paraffin blocks suspended in water to show root development

to solidify. From the circular layer thus secured, the desired blocks can be cut with various-sized cake cutters.

The blocks of paraffin thus secured are then perforated in one of two ways. In the one the ordinary cork-borer is employed, using two of different diameters, making a perforation with the smaller through the entire block, and then with the larger borer through the upper portion of the block. In this way a perforation is secured with a small shelf upon which the germinating seedling can be placed. Equally satisfactory has proved the method of

using a piece of ordinary glass tubing which has been drawn out in a conical form. By pushing this through the paraffin a perforation is secured which is larger at the top and smaller at the bottom of the block, and which will prevent the seed from falling through into the liquid in which the paraffin blocks are to be suspended. In this manner one can make a support of any size and with as many perforations as desired. These blocks when placed in the liquid culture medium serve automatically to keep the roots immersed

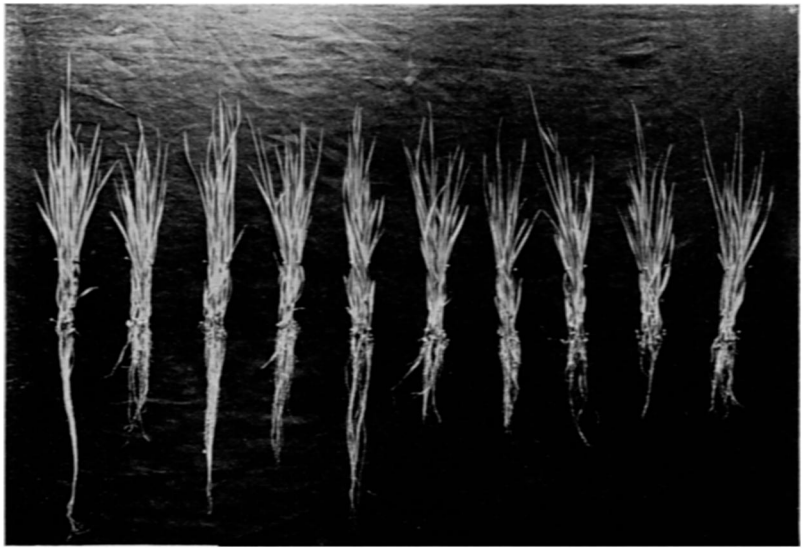

FIG. 3.—Same seedlings as in fig. 2, but removed from water; far less differentiation in root development is evident.

in the liquid, since they are free to rise and fall with variations in the level of the nutrient solution. This is impossible with a cork which fits snugly in the neck of the vessel, unless one continually restores the water lost by transpiration and evaporation.

The size of the block, as well as the perforations, will depend entirely upon the seedlings to be grown, making them large for peas and corn, and small for wheat and clover. The blocks thus prepared can be floated upon the culture medium in which the seedlings are to be grown, and, as already stated, will rise and fall

with changes in the elevation of the nutrient solution. Sufficient bulk must be given to the blocks to provide for the increased weight resulting from the growth of the plant.

The most suitable receptacle for floating these block cultures has been found in the form of an ordinary hydrometer cylinder which has the enlargement at the upper portion of the cylinder. This is well shown in the accompanying illustration (fig. 1).

For photographic purposes of seedlings thus grown these floats with their burden are placed in large, flat, glass vessels similar to the rectangular museum jars which are now being employed. In this way the root systems are well distributed and give a photograph revealing any differences which may exist in the root development. A comparison of the two photographs submitted (figs. 2 and 3), the one taken as above described, the other after removal from the water demonstrates this feature very strikingly, and proves the advantages of photographing as described. This method of photographing is considered worthy of employment where work of a similar nature is performed and presented.

AGRICULTURAL BACTERIOLOGICAL LABORATORIES
UNIVERSITY OF WISCONSIN, MADISON, WIS.